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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/656,713	09/07/2000	Tsuyoshi Moriya	Q60775	2126

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EXAMINER

KIBLER, VIRGINIA M

ART UNIT PAPER NUMBER

2623

DATE MAILED: 01/06/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/656,713

Applicant(s)

MORIYA ET AL.

Examiner

Virginia M Kibler

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 September 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15, 17-39, 41-43, 45-51, 53-58 and 103-129 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15, 17-39, 41-43, 45-51, 53-58 and 103-129 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. The amendment received on 9/23/04 has been entered. Claims 1-15, 17-39, 41-43, 45-51, 53-58, and 103-129 remain pending.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-3, 5-7, 9-13, 17, 23, 24, 26-29, 32-34, 37-39, 41, 42, 51, 55-57, 103-105, 107, 109-112, 114, 116-121, 124-126, 128, and 129 are rejected under 35 U.S.C. 102(b) as being anticipated by Ito et al. (JP 10-232196).

Regarding claims 1, 32, 103, and 119, Ito et al. ("Ito") discloses monitoring a size of a particle (Abstract) including a laser beam source 11 which radiates a laser beam to an area in which particles exist (Para. 0014); a photodetector 14 which is comprised of a plurality of pixels, which receives the laser beam having been scattered by the particles, and outputs image data including brightness of pixels (Para. 0024); and an area detector which determines pixels that are simultaneously irradiated by said laser beam scattered by one of said particles, and that are located adjacent to each other among pixels having a brightness equal to or greater than a

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predetermined threshold brightness (Para. 0025), as a group of pixels corresponding to an area on which a laser beam scattered by a particle is incident (Para. 0039).

Regarding claims 2, 33, 104, and 120, Ito discloses a maximum brightness detector which detects a maximum brightness among levels of brightness of pixels in the group and a measurement unit which compares the maximum brightness to the predetermined threshold brightness to thereby measure a relative size of the particles (Para. 0046-0047).

Regarding claims 3 and 105, Ito discloses a maximum brightness detector which detects a maximum brightness among levels of brightness of pixels in the group and a measurement unit which measures an intensity of the scattered laser beam, based on the maximum brightness, and measures a relative size of the particles based on the intensity of the scattered laser beam in accordance with an equation which defines a relation between an intensity of a scattered laser beam and a relative size of particles (Para. 0046-0047).

Regarding claims 9, 39, 110, and 125, Ito discloses a counter which counts a number of pixels in the group and a measurement unit which compares the number to a predetermined threshold number to thereby measure a relative size of the particles (Para. 0016-0018).

Regarding claims 23, 51, 116, and 129, Ito discloses a first measurement unit which measures an intensity of the scattered laser beam based on brightness of pixels in the group and a second measurement unit which measures a relative size of the particles based on the intensity of the scattered laser beam in accordance with an equation which defines a relation between an intensity of a scattered laser beam and a relative size of particles (Para. 0046-0047).

Regarding claims 24, 34, 117, and 121, the arguments analogous to those presented above for claim 3 are applicable to claims 24, 34, 117, and 121.

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Regarding claims 5, 11, 26, 37, 41, 55, 111, and 126, Ito discloses a scanner which scans the laser beam emitted from the laser beam source (Para. 0010).

Regarding claims 6, 12, 27, and 112, Ito discloses the photodetector including a CCD camera (Para. 0005) comprised of a plurality of light-receiving devices arranged in a matrix (Para. 0024).

Regarding claims 7, 10, 13, 28, 38, 42, 56, 107, 109, and 124, Ito discloses a counter which counts up a number of the groups (Para. 0039).

Regarding claims 17 and 114, the arguments analogous to those presented above for claims 2 and 7 are applicable to claims 17 and 114.

Regarding claims 29, 57, 118, and 128, Ito discloses calculating a size of a particle in accordance with the equation of Rayleigh scattering and a threshold size to which a calculated size is to be compared (Para. 0017).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 30 and 50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ito et al. (JP 10-232196) as applied to claims 29 and 57.

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Regarding claims 30 and 58, Ito does not appear to specify the threshold size being equal to or smaller than a minimum diameter among diameters of wirings in a semiconductor device to be fabricated. However, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the threshold disclosed by Ito to explicitly state a specific threshold as a design parameter.

6. Claims 15, 18-21, 43, 47-50, 113, 115, and 127 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ito et al. (JP 10-232196) as applied to claims 1, 103, and 119 above, and further in view of Yamaguchi et al. (5,929,980).

Regarding claims 15, 43, 113, and 127, Ito does not appear to recognize calculating a total brightness of pixels in the group. However, Yamaguchi teaches that it is known to calculate a total of brightness of the pixels detected by the area detector and comparing to a threshold to thereby measure a relative size (Col. 19, lines 11-19). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the detection of the brightness of the pixels disclosed by Ito to include determining the total brightness, as taught by Yamaguchi, because it is well known and is an alternative method of determining the relative size of the particles from the output of the photodetector.

Regarding claims 18 and 115, the arguments analogous to those presented above for claims 15 and 17 are applicable to claims 18 and 115.

Regarding claims 19 and 47, the arguments analogous to those presented above for claim 5 are applicable to claims 19 and 47.

Regarding claim 20, the arguments analogous to those presented above for claim 6 are applicable to claim 20.

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Regarding claims 21 and 48, the arguments analogous to those presented above for claim 7 are applicable to claims 21 and 48.

Regarding claims 49 and 50, the arguments analogous to those presented above for claims 29 and 30 are applicable to claims 49 and 50, respectively.

7. Claims 4, 25, 35, 53, 106, and 122 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ito et al. (JP 10-232196) as applied to claims 3, 23, 34, 51, 103, and 119 above, and further in view of Uesugi et al. (JP 10-010036).

Regarding claims 4, 25, 35, 53, 106, and 122, Ito does not appear to disclose judging whether a relative size of the particles is greater than a predetermined threshold in order to judge whether the particles would exert harmful influence on a semiconductor device. However, Uesugi et al. ("Uesugi") teaches that it is known to judge whether the relative size of the particles is greater than a predetermined threshold size in order to judge whether the particles would exert harmful influence on a semiconductor device and ceases fabrication if the relative size of the particles has been judged to be greater than a predetermined threshold size (Para. 0031-0033). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the measurement unit disclosed by Ito to include judging whether fabrication should be ceased based on the relative size of the particles as taught by Uesugi because particulate contamination control is well known in the art and affects the yield of large scale integrated circuits.

8. Claim 45 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ito et al. (JP 10-232196) and Yamaguchi et al. (5,929,980) as applied to claim 43 above, and further in view of Uesugi et al. (JP 10-010036).

Regarding claim 45, the arguments analogous to those presented above for claim 4 are applicable to claim 45.

9. Claims 8, 14, 31, and 108 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ito et al. (JP 10-232196) as applied to claims 1, 9, 23, and 103 above, and further in view of Comita et al. (6,368,567).

Regarding claims 8, 14, 31, and 108, Ito does not appear to recognize including a heater. However, Comita et al. ("Comita") teaches that it is known to include a heater for heating a chamber to remove by-products from the chamber (Col. 3, lines 22-27). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the chamber in which the particles are generated as disclosed by Ito to include a heater, as taught by Comita, because it removes wafer processing by-products (Col. 3, lines 23-24).

10. Claims 22 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ito et al. (JP 10-232196) and Yamaguchi et al. (5,929,980) as applied to claims 15 and 43 above, and further in view of Comita et al. (6,368,567).

Regarding claims 22 and 46, the arguments analogous to those presented above for claim 8 are applicable to claims 22 and 46.

11. Claims 36, 54, and 123 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ito et al. (JP 10-232196) and Uesugi et al. (JP 10-010036) as applied to claims 35, 53, and 122 above, and further in view of Comita et al. (6,368,567).

Regarding claims 36, 54, and 123, the arguments analogous to those presented above for claim 8 are applicable to claims 36, 54, and 123.

Response to Arguments

12. Applicant's arguments filed 9/23/04 have been fully considered but they are not persuasive.

Summary of Applicant's Argument: Ito discloses measuring light scattered by a particle and a means for displaying a motion of the particle during a certain fixed time span as a locus of scattered light. Ito does not disclose an area detector which determines as a group pixels that are simultaneously irradiated by laser light scattered by a particle, and that are located adjacent to each other.

Examiner's Response: Ito discloses measuring light scattered by a particle and a means for displaying a motion of the particle during a certain fixed time span as a locus of scattered light, as indicated by the Applicant. However, Ito discloses obtaining a measurement every 5s (Para. 0024-0025). Each measurement entails pixels that are simultaneously irradiated by the laser beam scattered by one of the particles. Therefore, Ito's disclosure meets the claimed language of an area detector which determines pixels that are simultaneously irradiated by the laser beam scattered by one of the particles, and that are located adjacent to each other, among pixels having a brightness equal to or greater than a predetermined threshold brightness as a group.

Conclusion

13. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Other Prior Art Cited

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Pat. No. 5,471,298 to Moriya for measuring size of particle or defect.


Contact Information

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Virginia M Kibler whose telephone number is (703) 306-4072. The examiner can normally be reached on Mon-Thurs 8:00 - 5:30 and every other Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on (703) 308-6604. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Virginia Kibler
1/5/05

MEHRDAD DASTOURI
PRIMARY EXAMINER

